Hazard Elimination Project Evaluation

Project Log # 200502097

Hazard Elimination Project W-3612

Evaluation of Median Guardrail Installation on I-40 from NC 16 to Iredell County Line, Catawba County

Documents Prepared By:

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Hazard Elimination Project Evaluation Documentation

Subject Location

Evaluation of Hazard Elimination Project W-3612 – Installation of median guardrail on I-40 from NC 16 to the Iredell County Line in Catawba County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis has been completed to measure the effectiveness of this hazard elimination project. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The safety countermeasure chosen for the subject location was the installation of weak post median barrier on I-40 from NC 16 to the Iredell County Line. I-40 in this area is a four-lane divided freeway with a median width of 36 feet. The project was let in August of 1997 and closed out in February of 1998 with an estimated cost of $780,000.

There was no information in the project folder regarding the crash history or the development of this project.

Naïve Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from August 1, 1997 through February 28, 1998. The before period consisted of reported crashes from January 1, 1992 through July 31, 1997 (5 Years 7 Months) and the after period consisted of reported crashes from March 1, 1998 through September 30, 2003 (5 Years 7 Months). The ending date for this analysis was determined by the available before period crash.

The treatment data consisted of all crashes on the 8.31 mile strip of I-40 from NC 16 (milepost 11.36) to the Iredell County Line (milepost 19.67) with a 0 foot y-line. Please see the attached *Location Map* for further detail.

The following table depicts the Naïve Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Please note that Ran Off Road crash types were the target crashes for the applied countermeasure. Ran Off Road crash types considered are as follows: Ran Off

Road – Left, Ran Off Road – Right, Ran Off Road – Straight, Fixed Object, Head-on, Sideswipe – Same Direction, Sideswipe – Opposite Direction, and Overturn / Rollover.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	247	387	56.7%
Total Severity Index	7.39	4.28	-42.1%
Ran Off Road Crashes	121	229	89.3%
Ran Off Road Severity Index	7.91	4.3	-45.6%
Volume	32,700	39,000	19.3%

Target Crash Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Fatal Injury Crashes	5	1	-80.0%
Non-Fatal Injury Crashes	34	55	61.8%
Total Injury Crashes	39	56	43.6%
Night Crashes	29	69	137.9%
Wet Crashes	26	54	107.7%

Across Median Crash Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Across Median Crashes	20	1*	-95.0%
Fatal Across Median Crashes	6	0	-100.0%
Median Barrier Hits	N/A	128	
Across Median, Barrier Breaching Crashes	N/A	1	
Barrier Breach Rate	N/A	0.78%	

The naïve before and after analysis at the treatment location resulted in a 57 percent increase in Total Crashes, an 89 percent increase in Target Crashes, a 44 percent increase in Target Injury Crashes, and a 19 percent increase in Average Daily Traffic (ADT). Further investigation shows there was a 42 percent decrease in Severity Index for Total Crashes and a 46 percent decrease in the Severity Index for Target Crashes. The before period ADT year was 1994 and the after period ADT year was 2001.

Across median crashes have decreased 95 percent and across median fatal crashes have decreased 100 percent. The one across median crash in the after period involved a vehicle flipping over the median guardrail. There was one crash in the before period and two crashes in the after period that involved vehicle debris crossing the median. These crashes were not included in the across median crash summary.

Results and Discussion

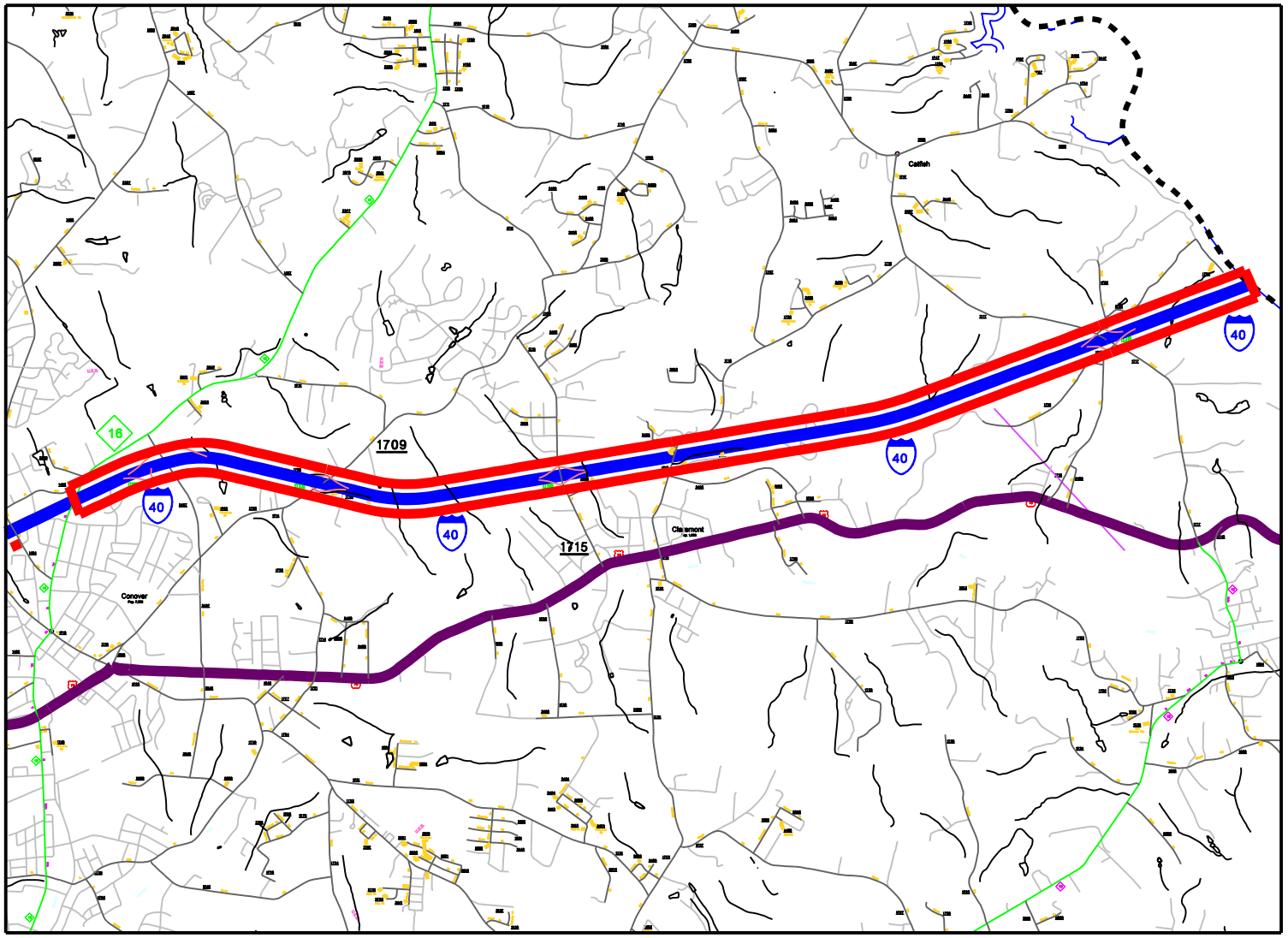
The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 57 percent increase in Total Crashes and an 89 percent increase in Target Crashes. The Severity Index of Total Crashes and Target Crashes has decreased 42 and 46 percent respectively using naïve methodologies. Further investigation shows that across median crashes decreased 95 percent and across median fatal crashes decreased 100 percent. The summary results above demonstrate that the treatment location appears to have had a significant increase in number Total Crashes and Target Crashes and a significant decrease in the Severity Index of Total and Target Crashes from the before to the after period.

Typically, one would expect guardrail installation projects to result in an increase in the frequency and a decrease in the severity of Ran Off Road crashes. The increase in Ran Off Road Crashes is expected due to the placement of a fixed object (guardrail) near the travel way. The decrease in the severity of Ran Off Road Crashes is expected due to the guardrail being more forgiving than the object it is protecting. The results from this project seem to be in concurrence with the above-mentioned expectations. The greatest benefits from this project are seen when looking specifically at the across median crash data. The across median crash pattern present in the before period has been virtually eliminated by the implementation of median guardrail under this project.

It should also be noted that the number of Target Crashes at night has increased by 138 percent and the number of Target Crashes during wet roadway conditions has increased by 108 percent. When looking at Total Crashes, the number of night crashes has increased 127 percent and the number of wet crashes has increased 35 percent. This increase is likely in part due to the fact that Ran Off Road crashes are more likely to occur during night or wet roadway conditions. Since the number of Ran Off Road crashes has increased due to the presence of the guardrail, it is logical that wet and night crashes would also see some increase. This connection will be explored further as more median guardrail projects are evaluated.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

Location Map, Catawba County
Evaluation of W–3612



Treatment Strip: I–40 From NC 16 to Iredell County Line

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